

AQUILAPOLLENITES IN THE BRITISH ISLES

by A. R. H. MARTIN

ABSTRACT. Species of *Aquilapollenites* Rouse emend. Funkhouser are present in the interbasaltic lignites of Shiaba and Bremanoir, Mull, Scotland. The bearing of this on the age of the lignites is discussed; it is believed that this may be pre-Eocene.

THE genus *Aquilapollenites* Rouse (1957) emend. Funkhouser (1961) has been regarded as an important indicator pollen fossil of the uppermost Cretaceous, Palaeocene, and Lower Eocene of parts of the Northern Hemisphere, at least Western and Plains states of North America and North-west and Central Siberia. Funkhouser (1961) and Stanley (1961) refer to the lack of records of the genus from western Europe. However, at about the same time, a posthumously published paper by J. B. Simpson (1961) described the genus *Taurocephalus* as new and ascribed to it the single species *T. proteus*, which was regarded as an extinct member of the Proteaceae. This very characteristic pollen is clearly *Aquilapollenites*, but as the description differs somewhat from the published description of *Aquilapollenites*, a brief explanation is offered.

Simpson apparently saw in polar view, the fine furrows which in *Aquilapollenites* have been described as demicolpoids, but interpreted these as a proximal-face triradiate mark such as he believed to occur in some Proteaceae. The two polar lobes of the grain (Pl. 106, fig. 6), superimposed one over the other, appear to have been taken for a single distal pore resembling the three equatorial protrusions which were also described as pores. These were correctly described as differing from all extant Proteaceae in that ectexine covered the supposed pores. Simpson's own photographs (1961, pl. xii, figs. 1, 2, and 5, for example) show that two polar protrusions are present. *Taurocephalus* is described as sometimes having four equatorial arms; this is the only way of reconciling the appearance of Simpson's figs. 1 and 5 with his description since these are equatorial views. However, his plate xii, fig. 11 is a specimen with four true equatorial arms seen in polar view. The specimen has been re-located and re-photographed (Pl. 106, figs. 1-3). This feature had not been observed before in *Aquilapollenites*. Four-armed grains are probably of low incidence.

In examining the material from Mull, in which *Aquilapollenites* occurs, a second species and a few grains of a third were observed. Indeed *Taurocephalus proteus* is likely to be a compound of two of these species (see taxonomic section). To find these in sediments believed to be of Miocene or Pliocene age (the interbasaltic lignites of Shiaba and Bremanoir) suggests that the dating of the lignites should be reconsidered. An age between Maastrichtian and Lower Eocene seems most likely. The reliance on high percentages of coryloid, quercooid, and Hamamelidaceae-type pollens seems misplaced when it is realized that these pollens have a very extended time range. Manum (1962), for example, reports many such grains in the Tertiary of Vestspitsbergen, which on zoological grounds is thought to be late Palaeocene to Eocene. British phytogeographers, reluctant to accept the Mull interbasaltics as contemporary with the London Clay

flora, would probably be sympathetic towards the earlier rather than the later end of the range in time indicated by *Aquilapollenites* i.e. uppermost Cretaceous rather than Eocene.

Several other pollen grain types present in the interbasaltic beds are consistent with the earlier dating here proposed. These include *Classopollis* sp. (Pl. 106, figs. 15–16), which though uncommon, does not show any obvious signs of redeposition and, in lignite, is less likely to be re-deposited. The known range is Triassic to Eocene but it is uncommon after the mid-Cretaceous. *Haloragis bremanoirensis* Simpson is conspecific with *Nudopollis thiergartii* Pflug, an indicator of the Palaeocene in Germany, though ranging from the Maastrichtian to Lower Eocene.

A search for *Aquilapollenites* on slides, prepared by Simpson, of the pre-basaltic lignite of Ardslishigh, Ardnamurchan, failed to reveal any. All the slides quoted in the paper of 1961 were re-examined. Most were in fair condition, with pollen grains still stained by safranin, though some had developed small crystals in the glycerine jelly mountant.

SYSTEMATIC DESCRIPTION

ANGIOSPERMAE *Incertae sedis*

Genus AQUILAPOLLENITES Rouse emend. Funkhouser (April 1961)

Taxonomic synonymus. *Parviprojectus* Mchedlishvili (July 1961); *Taurocephalus* Simpson (December 1961).

Aquilapollenites spinulosus Funkhouser (*Taurocephalus proteus* Simpson pro parte)

Plate 106, fig. 7

Size range (10 grains). Polar axis 35–43 μ (av. 38 μ); tips of equatorial projections to polar axis 19–25 μ (av. 23 μ); (ratio 0.5–0.67).

Location. Bremanoir and Shiaba interbasaltic lignites, Mull, Scotland.

Known time range. Palaeocene–Eocene (Funkhouser 1961); Maastrichtian (Srivastava 1966).

Aquilapollenites attenuatus Funkhouser (*Taurocephalus proteus* Simpson pro parte)

Plate 106, figs. 1–6

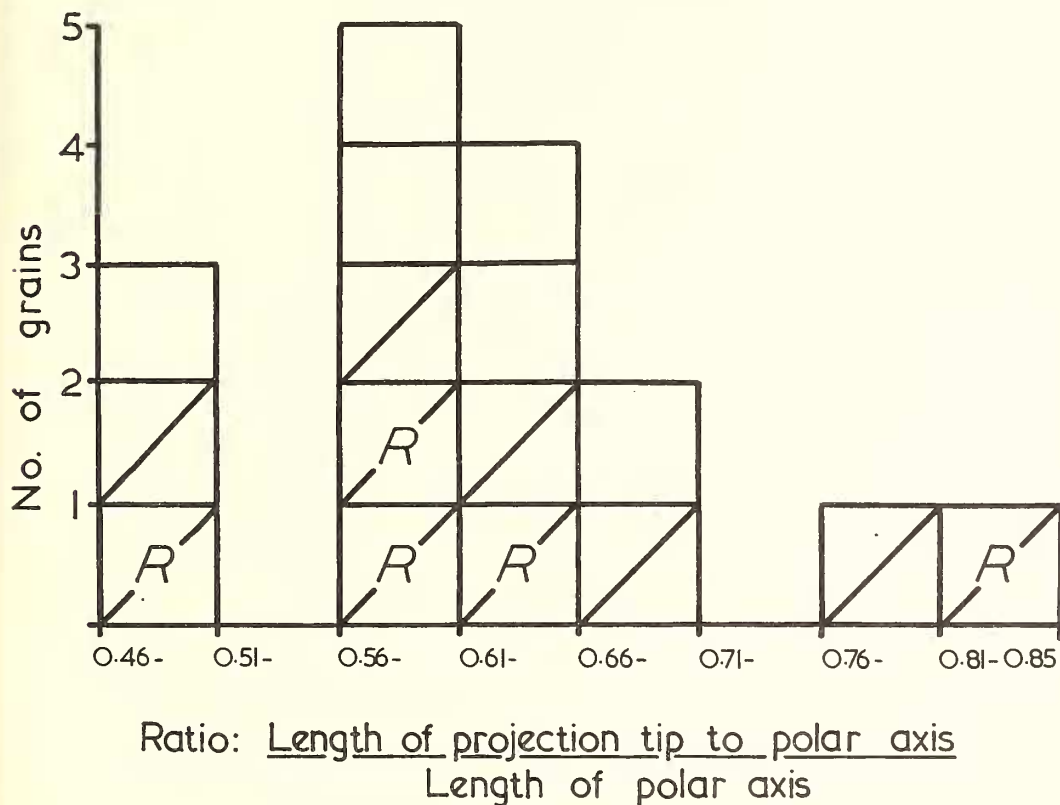
Size range (5 grains). Polar axis 28–42 μ (av. 36 μ); tips of equatorial projections to polar axis 21–24 μ (av. 23 μ); (ratio 0.5–0.8). Four-armed grains are of rare occurrence.

Location. Bremanoir and Shiaba interbasaltic lignites, Mull, Scotland.

Known time range. Maastrichtian (Funkhouser 1961, Srivastava 1966).

Distinction. The characters held to distinguish *A. spinulosus* from *A. attenuatus* are the shorter equatorial protrusions, the absence of puncta and the scattering of spinules over the whole surface instead of being grouped. In the Scottish material, while it is possible to find specimens corresponding to the two forms, there are a good many which combine features of both (text-fig. 1). The term ‘punctate’ could be applied to 70% of the Mull specimens, including both long and short-armed ones and to some with scattered

as well as those with grouped spinules. It is too early to suggest that a single polymorphic form is represented, but clearly there is a need for further study of the variability shown by these forms.



TEXT-FIG. 1. Number of *Aquilapollenites spinulosus* and *A. attenuatus* grains falling into different polar length/equatorial radius classes. Crossed squares = punctate grains. R indicates grain with spinules restricted to parts of surface.

Aquilapollenites pachypolus nom. nov.

Plate 106, figs. 8-14

Nomenclatural synonym. *Parviprojectus striatus* Mtchedlishvili 1961, pl. 73, fig. 1a-c. The genus *Parviprojectus* is a later homonym of *Aquilapollenites* as emended by Funkhouser and within that genus the name *striatus* is preoccupied by *A. striatus* Funkhouser. It is therefore necessary to give a new name to this very distinctive form. A translation of Mtchedlishvili's diagnosis and description of *Parviprojectus striatus* follows:

Diagnosis. Pollen grains rather large sized, tricolpate. Body broadly ellipsoidal in form, equatorial projections short, colpi resembling cracks. Exine thick, pilate, striate, but having thickenings on the polar areas.

Description. Length of grain 46.0–46.6 μ ; diameter of body 27.4–31.0 μ , length of equatorial projections 9.7 μ , their width 7.7–9.0 μ .

Pollen grains tricolpate. Outline of body in equatorial view broadly ellipsoidal. Exine thickness about 2.0 μ . Nexine layer only slightly thinner than sexine layer, tapering from the proximal end of the projection. Sexine consisting of pila which have grown together to form comb-like lirae. In sectional view are seen the thinner parts of the columns and the round heads. The lirae are situated at a slight angle to each other and sometimes branch, forming the characteristic striate structure of the grain. At the poles the sexine layer becomes considerably wider, forming thickened polar areas which have a corrugated structure. On the equatorial projections the sexine layer becomes considerably thinner. Colour of grains brown.

Size range of Scottish specimens (5 grains). Polar axis 35–43 μ (av. 40 μ); equatorial axis 28–33 μ (c. 38 μ tip to tip of protrusions); thickness of the polar area 4.5–6.0 μ .

Location. Shiaba interbasaltic lignites, Mull, Scotland.

Known time range. Maastrichtian–(?) Danian (Samoilovich and Mtchedlishvili 1961).

Distinction. The grains are distinguishable from *A. murus* Stanley, and *A. bertillonites* Funkhouser by the thickened polar areas. They are partially distinguishable by their generally larger size and shorter projections. The colpoids are very narrow, rather indistinct, and in one specimen (Pl. 106, fig. 10), pores appear to be present. The size of Scottish specimens is smaller than in the two Siberian specimens.

EXPLANATION OF PLATE 106

Magnification of all figures, $\times 1,000$.

Figs. 1–3. *Aquilapollenites attenuatus* Funkhouser (*Taurocephalus proteus* Simpson pro parte). Specimen with four equatorial arms, also showing demicolpi; slide Bremanoir 5a (= Simpson 1961, pl. xii, fig. 11). 1, High focus, polar area. 2, High focus, exine pattern, showing baculi (puncta) and spines. 3, Low focus, exine pattern (LO-pattern).

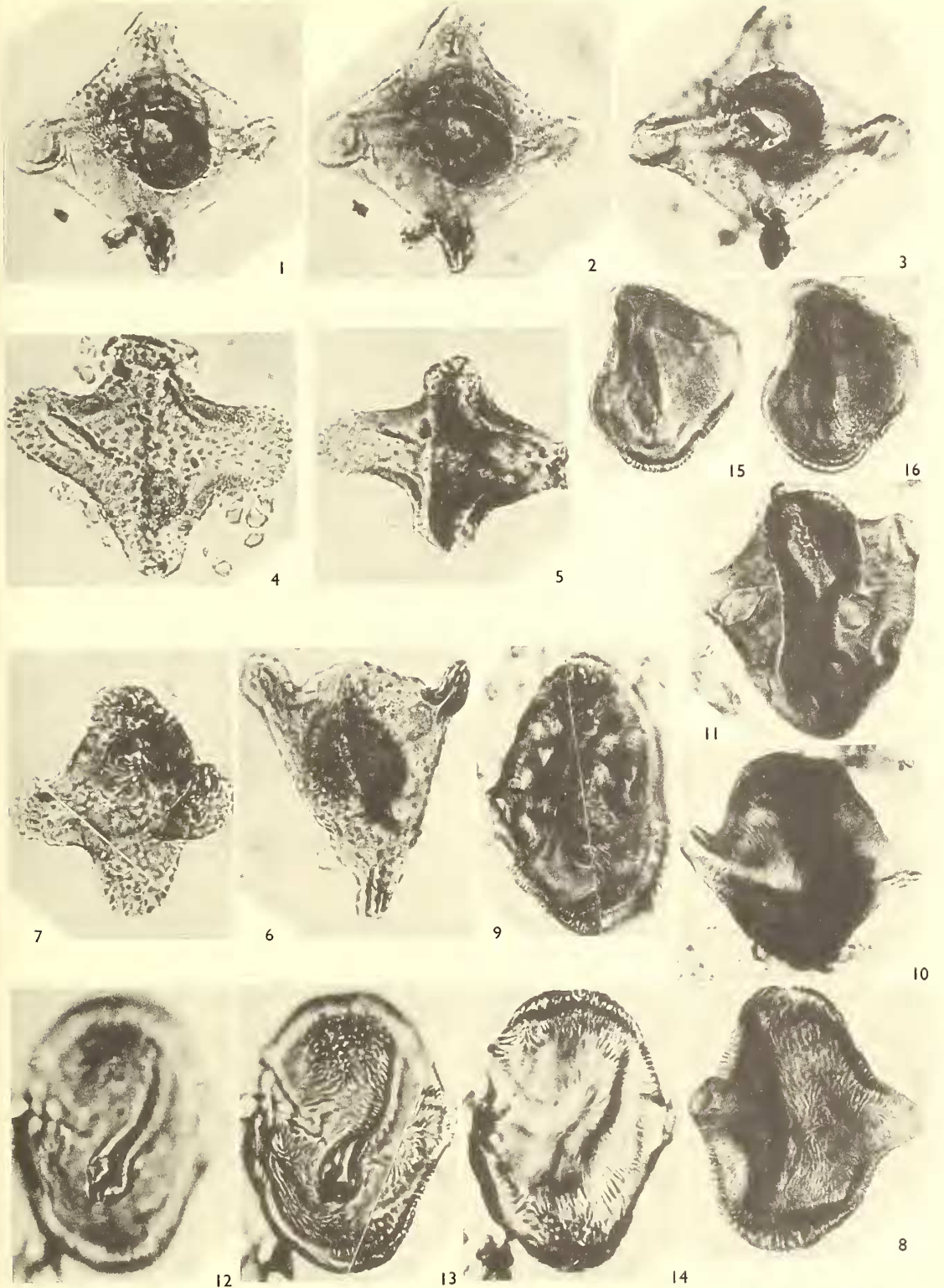
Figs. 4–6. *Aquilapollenites attenuatus* Funkhouser. 4, Equatorial view, showing well-defined double pattern of spines and baculi (LO-pattern); slide Shiaba 29a. 5, Equatorial view of small grain showing typical *attenuatus* shape, but lacking distinct LO-pattern; slide Bremanoir 5a. 6, Polar view; slide Bremanoir 5a.

Fig. 7. *Aquilapollenites spinulosus* Funkhouser (*Taurocephalus proteus* Simpson pro parte). Equatorial view, showing scattered spines and lack of distinct LO-pattern; slide Bremanoir 5a.

Figs. 8–14. *Aquilapollenites pachypolus* nom. nov. (*Parviprojectus striatus* Mtched.). 8, Equatorial view, showing striate pattern, short projecting arms, and thickened polar area; slide Shiaba 1a. 9, Surface and median view to show thickening of both ectexine and endexine in polar area; slide Shiaba 22a. 10, Small grain, with apparent pore-apertures on equatorial arms, showing some convergence towards *A. bertillonites* Funkhouser; slide Shiaba 22a. 11, Oblique view, sculpture of polar area insuluous, colpoid visible in facing projection; slide Shiaba 1a. 12–13, Successive views through specimen with upward projecting arm, showing the continuation of the striate pattern over the narrow indistinct colpoid, thus demonstrating that the colpoid is restricted to the endexine. 14, The same, focused on pattern of lower surface of grain; slide Shiaba 36f.

Figs. 15–16. *Classopollis* sp. High and low focus of striate exine surrounding pore, which faces to right; slide Shiaba 1a.

All photographs from original slides prepared by J. B. Simpson, and housed in Scottish Geological Survey Office, Edinburgh.



MARTIN, *Aquilapollenites* from Scotland